SECTION 4

SAMPLE COLLECTION PROCEDURES

Contained within this section are various approved procedures related to sample collection activities which may be performed as part of site characterization projects at various depots. These approved procedures will be used to ensure the samples are collected in a consistent manner. The approved procedures contained is this section are:

4.1 Soil Sampling Procedures

4.2 Surface Water Sampling Procedures

4.3 Sediment Sampling Procedures

4.4 Boring Using a Geoprobe

4.5 Boring With a Standard Drilling Rig

4.6 Groundwater Sampling Procedures

4.7 Radiological Survey Procedures

4.8 Decontamination Procedures

4.9 Record Keeping Procedures

4.10 QA/QC Sample Collection Procedures

4.11 Investigation Derived Waste Procedures

Appendix B provides procedures for the operation of certain measuring devices which may be used in the field. The procedures included in Appendix B are:

B.1 Photoionization Detector

B.2 Water Level Indicator

B.3 Eberline HP-260

B.4 Temperature, Turbidity, pH and Conductivity

B.5 Well Development

B.6 GPS Survey Guidelines

The locations of all samples will be determined by Parsons' Field Staff using the Global Positioning Satellite (GPS) procedures presented in Appendix B.6 or by subcontract surveyors. The procedures employed by subcontract surveyors will be defined in their cost/scope proposal.

4.1 SOIL SAMPLING PROCEDURES

4.1.1 Scope and Purpose

This section provides approved procedures for soil sampling. The objective of the guideline is to ensure a representative soil sample is collected at each designated sampling location to accurately define the constituent concentrations and to determine whether the depot activities have impacted soil quality.

4.1.2 Sampling Process

Soil samples will be collected using a hand auger unless otherwise specified in the project-specific work plan. Listed below is the process for collecting soil samples:

1. A new pair of clean disposable latex or nitrile gloves will be donned at each sampling location.
2. Prepare the sampling location by removing all vegetation, roots, etc., from the sampling point.
3. Advance a decontaminated hand auger to the desired sampling depth below ground surface.
4. Remove the hand auger from the boring and use a decontaminated stainless steel spoon to remove the sample from the auger boring.
5. Encore samplers will be used to collect the VOC portion of the sample by pressing the sampler into the side of the soil core. The Encore Sampler will be placed in the laboratory-supplied bag, sealed, labeled and placed in the sample cooler.
6. Place the remaining sample into a decontaminated bowl (stainless steel or Pyrex).
7. Once enough sample has been collected, homogenize the sample using the quartering method, as appropriate for the sampling objectives (see below). When the sample has been completely mixed, fill the remaining sample containers in reverse order according to volatility.
8. After the sample bottles are filled, the caps will be placed on the bottles and the bottles will be packaged for shipment as specified in Section 5.0.
9. QA/QC samples will be collected as specified in Sampling Guideline 4.10.
10. Backfill the boring with the soil removed from the hole and return the site to its original condition to the extent possible.

The cut and quartering technique is as follows:

- The sample will be thoroughly mixed in a bowl, and divided into quarters.
- A portion of the soil will be gathered from two of the quartered sections. This process will be repeated until the amount of soil needed to completely fill the sample containers has been obtained.

- It is very important that the soil samples be mixed as thoroughly as possible to ensure that the sample is representative of the interval sampled.

4.1.3 Records

Soil sampling records will be kept in the field logbook. The information to be recorded will include the general requirements presented in Record Keeping Guideline 4.9. The following records will also be reported:

1. Name and location (including sample interval) of the soil sample and boring.
2. Depth to top of sample and soil description when applicable.
3. Type of equipment used during the soil sampling/boring.
4. Sample location (see Section 4.11).

4.2 SURFACE WATER SAMPLING PROCEDURES

4.2.1 Scope and Purpose

This section provides the approved procedures for collecting surface water samples. The purpose of the guideline is to ensure that the surface water samples are collected in such a manner as to minimize the introduction of sediments into the sample and ensure that a representative sample is collected at each designated location. The samples will be analyzed to assess whether depot activities have impacted surface water quality.

4.2.2 Sampling Process

The surface water sample collection location should be deep enough so the sample bottles can be completely submerged (if possible), in an area with minimal flow or surface disturbance to minimize the loss of volatiles, and free of suspended material. Downstream samples will be collected first and disturbances during wading should be avoided. At locations where both surface water and sediments will be collected, the surface water samples should be collected before sediment samples. The process for collecting surface water samples is as follows:

1. A new pair of clean disposable latex or nitrile gloves will be donned at each sampling location.
2. Facing upstream, submerge pre-labeled sample bottles in the upright position to prevent the loss of preservative into the water. Sediment should not be disturbed during the collection of surface water samples.
3. Allow sample bottle to fill and use bottle cap if necessary to fill the bottle completely. The volatile organics vials will be filled so that no headspace exists. If samples cannot be collected directly into the sample bottle, a decontaminated sample collection device may be used.
4. After the sample bottle is filled, the cap will be placed on the bottle and the bottle will be packaged for shipment as specified in Section 5.0.

5. Conductivity, pH, turbidity, and temperature, will be measured after sample collection. The measurements will be recorded in the field logbook.
6. QA/QC samples will be collected as specified in Sampling Guideline 4.10.
7. If filtered samples are required, a Grundfos pump will be used to pull the sample through an in-line 45-micron filter. The sample will be drawn directly from the surface water body, or from a sample aliquot collected into a laboratory-supplied, preservative-free sample bottle. The sample will be discharged from the filter line outlet directly into laboratory-supplied prepreserved sample bottles. Alternate methods, if used, will be described in the site-specific work plan.

4.2.3 Records

Sample collection records will be kept in the field logbook. The information recorded will include the general requirements presented in the Record Keeping Guideline 4.9. In addition, the following records will also be reported:

1. Sample location conditions (water flow, suspended matter, accessibility, presence of organic matter, etc.)
2. Description of how to get to sample point location.
3. Field measurements.

4.3 SEDIMENT SAMPLING PROCEDURES

4.3.1 Scope and Purpose

This section provides the approved procedures for collecting sediment samples. The purpose of the guideline is to ensure that the sediment samples are collected in such a manner to ensure that a representative sample is collected at each designated location. The samples will be analyzed to assess whether depot activities have impacted sediment quality.

4.3.2 Sampling Process

The sediment samples should be collected from background or furthest from the source locations first, to minimize the possibility of cross-contamination. Thereafter, the most downstream sediment samples will be collected followed by the next upstream samples. If surface water samples are to be taken at the same location, they should be collected before the sediment samples. The addition of organic matter into the sediment samples should be avoided. The process for collecting sediment samples is as follows:

1. A new pair of clean disposable latex or nitrile gloves will be donned at each sampling location.
2. In shallow streams and ditches that allow wading, sediment samples will be collected by using a decontaminated stainless steel spoon or scoop. In areas where wading is not possible, a hand auger or scoop attached to a pole may be needed to collect sediment samples.

3. While facing upstream, collect the sample by scooping along the bottom of the surface water body. Remove excess water and place the sediment sample into a decontaminated stainless steel bowl. Samples for volatile organic analysis will be placed directly into the pre-labeled sample bottle with no headspace remaining.
4. After a sufficient sample volume has been collected into the stainless steel bowl, the sample will be homogenized using the quartering method and then placed into the appropriate sample bottle.
5. After the sample bottle is filled, the cap will be placed on the bottle and the bottle will be packaged for shipment as specified in Section 5.0.
6. QA/QC samples will be collected as specified in Sampling Guideline 4.10.

4.3.3 Records

Sample collection records will be kept in the field logbook. The information recorded will include the general requirements presented in the Record Keeping Guideline 4.9. In addition, the following records will also be reported:

1. Sample location conditions (water flow, suspended matter, accessibility, presence of organic matter, etc.)
2. Description of how to get to sample point location.

4.4 BORING USING A GEOPROBE

4.4.1 Scope and Purpose

This section provides the approved procedures for advancing soil borings using a Geoprobe for the purpose of extracting groundwater samples. The purpose of the sampling is to determine whether or not groundwater quality at the boring locations has been impacted by the potential source areas.

4.4.2 Sampling Process

The approved procedures to be used when advancing Geoprobe borings and extracting groundwater samples is as follows:

1. Sampling locations will be determined in the field by the Parsons on-site geologist. Prior to advancing the Geoprobe, underground utilities in the area will be identified.

2. A new pair of clean disposable latex or nitrile gloves will be donned at each sampling location.

3. The Geoprobe borings will be advanced to just below the water table.

4. The outer sleeve will be retracted exposing the inner stainless steel screen.

5. Sample will be obtained using a peristaltic pump, tubing and check ball system, or a mini bailer.

6. In areas with low groundwater yield, a temporary piezometer constructed from pre-cleaned schedule 40 PVC (1" diameter) will be placed in the Geoprobe borehole after the downhole tools have been removed.

7. If the boring yields sufficient water to allow for sample collection completion within one hour, a peristaltic pump, tubing and check ball system, or a mini bailer will be used for sample collection per Section 4.6.

8. Groundwater will be removed under low-flow conditions to minimize turbidity when filling pre-cleaned, pre-preserved, pre-labeled sample bottles, starting with the collection of the samples for volatile organic analyses.

9. Make sure there are no bubbles or headspace in the volatile organic sample bottles.

10. Continue to fill remaining bottles.

11. If samples for metals analysis contain excessive silt, the samples may be allowed to settle. The less turbid sample will be decanted and sent to the laboratory for analysis.

12. After the sample bottle is filled, the cap will be placed on the bottle and the bottle will be packaged for shipment as specified in Section 5.0.

13. QA/QC samples will be collected as specified in Sampling Guideline 4.10.

14. Conductivity, pH, turbidity, and temperature will be measured after sample collection. The measurements will be recorded in the field logbook.

15. Once the sample collection process has been completed, the temporary casing will be removed and the borehole will be backfilled with soil removed from the hole. If the hole is not completely backfilled to ground surface with the soil removed from the hole, bentonite chips may be used to backfill the remaining space.

4.4.3 Records

Geoprobe records will be recorded in the field logbook. The information recorded will include the general requirements presented in Record Keeping Guideline 4.9. The following records will also be reported:

1. Name and location of the Geoprobe sample and boring.

2. Date and time that the Geoprobe boring/sampling was conducted.

3. Depth of sample.

4. Name of the persons overseeing and company conducting the Geoprobe borings.

5. Type of equipment used during the Geoprobe boring and during construction of the temporary piezometers, as well as soil description when applicable.

6. Type of equipment used during sampling, number and type of containers used for sampling purposes, and analyses to be conducted.

4.5 BORING WITH A STANDARD DRILLING RIG

4.5.1 Scope and Purpose

This section provides the approved procedures for advancing soil borings with a standard hollow-stem auger-drilling rig for the purpose of extracting soil samples. The purpose of the procedure is to determine whether or not subsurface soil at the boring locations has been impacted by depot activities.

4.5.2 Sampling Process

A stainless steel split spoon sampler will be used to collect subsurface soil samples in borings using a drilling rig, using the following procedure:

1. Determine and clear (for utilities) the boring location through the depot and the local underground facilities locating service. Surface materials such as vegetation may be removed from the boring location.
2. A minimum 2.5" inside diameter hollow stem auger will be used to advance the borehole to the desired subsurface depth.
3. Once the desired sampling depth has been reached, a decontaminated split spoon sampler will be used to retrieve the subsurface soil sample.
4. A new pair of clean disposable latex or nitrile gloves will be donned at each sampling location.
5. The split spoon sampler will be brought to the surface, and opened for sample collection and lithological description.
6. Encore samplers will be used to collect the VOC portion of the sample by pressing the sampler into the side of the soil core. The Encore Sampler will be placed in the laboratory-supplied bag, sealed, labeled and placed in the sample cooler.
7. After the VOC sample is collected, the remaining sample aliquot will be placed in a decontaminated stainless steel bowl, homogenized using the quartering method (see Soil Sampling Procedures 4.1), and then used to fill the remaining sample containers in order of reverse volatility.
8. Once the samples have been collected they will be packaged as specified in Section 5.0.
9. QA/QC samples will be collected as specified in Sampling Guideline 4.10.
10. Backfill the boring with the soil removed from the hole, place bentonite on the top of the backfilled hole, and restore the boring location to its original condition.

4.5.3 Records

Standard drilling rig records and soil sampling records will be kept in the field logbook. Boring log and well construction forms are provided in Appendix B. The information recorded will include the general requirements presented in Record Keeping Guideline 4.9, and the following:

1. Name and location of the boring.
2. Date and time that the boring/sampling was conducted.
3. Depth to top of sample and sample collection interval.
4. Names of the persons on-site and of the company conducting the borings.
5. Lithological description of subsurface soils for each boring location (see Figure 4.1).
6. Length of split spoon sampler and amount of recovered sample.

4.6 GROUNDWATER SAMPLING PROCEDURES

4.6.1 Scope and Purpose

This section provides the approved procedures for collecting groundwater samples from monitoring wells. The purpose of the guideline is to ensure that a representative sample is collected at each designated sampling location. The samples will be analyzed to assess whether depot activities have impacted groundwater quality.

4.6.2 Sampling Process

Prior to the collection of groundwater samples, the monitoring wells will be purged to remove the stagnant water which is not representative of aquifer conditions. Purge water disposal will be addressed in the project-specific work plan. A new pair of clean disposable latex or nitrile gloves will be donned at each sample location.

4.6.2.1 Monitoring Wells

The procedures for monitoring well purging and sampling are as follows:

1. Place plastic around wellhead.
2. Unlock protective casing and remove well cap.
3. Immediately (after well cap removal) take an organic vapor reading down the well casing using a photoionization detector and record reading in the field logbook.
4. Measure water level distance from top of casing and sound the total depth as detailed below. Record in logbook. Check tip of water level indicator for silt or product residue

(if either are observed note in logbook). If free product is suspected, check well first with an appropriate interface probe.

a. Lower decontaminated water level indicator into monitoring well until indicator sounds and light is illuminated.

b. Confirm that the water surface has been contacted by repeatedly raising and lowering the indicator at least three times to ensure a consistent sounding level has been reached.

c. Measure and record depth (nearest 0.01 feet) to the water surface from the top of casing in field logbook.

d. Lower the indicator to the well bottom and record the total depth.

e. Retrieve and decontaminate water level indicator.

5. Calculate volume to remove for purging.

6. Lower decontaminated purging device into well.

7. Begin to remove water from the well near the bottom.

8. Observe and record: odor, color, clarity, turbidity and general water condition in logbook. Also record changes in the physical condition of the monitoring wells that could affect the well integrity.

9. Temperature, pH, turbidity, and specific conductivity of the groundwater will be measured and recorded periodically during well purging. To ensure that equilibrium has been established, three consecutive readings will be recorded where one casing volume is pumped between each reading. The sample may be collected after the water has cleared sufficiently and the temperature, turbidity, pH, and conductivity have stabilized. Stabilization is defined as follows: temperature ± 1°C, turbidity ± 10%, pH ± 0.1 S.U., and conductivity ± 10 μmhos/cm^2. The goal for turbidity measurements is 50 NTU or less. If this cannot be achieved, and the turbidity has stabilized, the project manager and USACE will be contacted to discuss selection of appropriate actions.

10. At least 3 to 5 well volumes should be removed for purging to be considered complete. Wells with little or no recharge will be purged to near dryness. If a pump is used for well purging, it will be brought to the water surface prior to completion of purging activities to ensure complete removal of stagnant water.

Groundwater sample collection from a monitoring well will continue as follows:

1. Establish that the well has properly recharged (80% of static water level has recovered). Typically, no more than 16 hours should lapse between purge completion and sample collection, unless the method specified in Item 10 (below) is used.

2. Carefully lower a decontaminated bailer (with a fresh nylon line attached for each well) down the monitoring well. Disposable bailers may also be used.

3. Continue to lower the sample collection device to the desired sampling depth.

4. Raise the bailer and carefully fill pre-cleaned, pre-preserved, and pre-labeled sample bottles, starting with VOC samples.

5. Make sure there are no bubbles in the volatile organic samples.

6. Continue to fill remaining bottles.

7. After the sample bottle is filled, the cap will be placed on the bottle and the bottle will be packaged for shipment as specified in Section 5.0.

8. QA/QC samples will be collected as specified in Sampling Guideline 4.10.

9. Conductivity, pH, turbidity, and temperature, will be measured after sample collection. The measurements will be recorded in the field logbook.

10. If the 50 NTU goal for turbidity is not met, and the turbidity has stabilized as defined above, a quiescent sampling procedure may be employed (assuming concurrence by USACE and the regulatory agency). In this method, the well is purged as described, then allowed to sit overnight. The next day, the bailer will be slowly lowered into the top of the water column, and extracted without causing undo agitation of the water column in the well. The metals aliquot will be collected in this manner first, followed by the remaining parameters.

4.6.2.2 Water Supply Wells

Water supply wells that need to be sampled for constituents of concern, and are equipped with an operable pump, will also be purged of stagnant water. To do so, the total depth and diameter of the well should be known or accurately estimated, and it must be determined whether or not a storage tank exits. If a storage tank is present and is located before the sample port location, it must also be purged of stagnant water.

The procedures used for water supply well purging are as follows:

1. Locate a sample port or discharge location.

2. Determine volume to be removed based on total depth and diameter of the well and the storage capacity of the storage tank if it exists.

3. Activate the submersible pump in the well.

4. Begin to remove water from the well, and continue until it has been determined that the stagnant water has been removed based on discharge rate and well construction.

5. Observe and record: odor, color, clarity, turbidity and general water condition in logbook. Also record observed construction of the water supply well.

6. Temperature, pH, turbidity, and specific conductivity of the groundwater will be measured and recorded periodically during water supply purging. To ensure that equilibrium has been established, three consecutive readings will be recorded at five-minute intervals. The sample may be collected after the water has cleared sufficiently and the temperature, turbidity, pH, and conductivity have stabilized. Stabilization is defined as follows: temperature ± 1°C, turbidity ± 10%, pH ± 0.1 S.U., and conductivity ± 10 μmhos/cm^2. If well construction information is not available, then the recommended purge time is 15 minutes for a high volume pump.

Groundwater sample collection from a water supply well will be as follows:

1. Purge the well as described previously.

2. At the sampling port carefully fill pre-cleaned, pre-preserved, and pre-labeled sample bottles, starting with VOC vials.

3. Make sure there are no bubbles in the volatile organic samples.

4. Continue to fill remaining bottles.

5. After the sample bottle is filled, the cap will be placed on the bottle and the bottle will be packaged for shipment as specified in Section 5.0.

6. QA/QC samples will be collected as specified in Sampling Guideline 4.10.

7. Conductivity, pH, turbidity, and temperature will be measured after sample collection. The measurements will be recorded in the field logbook.

4.6.2.3 Monitoring Wells Using Low-Flow Method (and for Field-Filtered Samples)

Monitoring wells which contain excess silt and have a low yield will be purged using the low-flow method. This method of purging and well sampling will be used to minimize the volume of purge water removed from the well and to reduce the turbidity in the groundwater samples collected. The pumping device selected should operate at variable speeds to reduce aquifer stress and agitation.

The procedures used for purging a well using the low-flow method are as follows:

1. Place plastic around wellhead.

2. Unlock protective casing and remove well cap.

3. Immediately (after well cap removal) take an organic vapor reading down the well casing using a photoionization detector and record reading in the field logbook.

4. Measure water level distance from top of casing and sound the total depth as detailed below. Record in logbook. Check tip of water level indicator for silt or product residue (if either are observed note in logbook).

    a. Lower decontaminated water level indicator into monitoring well until indicator sounds and light is illuminated.

    b. Confirm that the water surface has been contacted by repeatedly raising and lowering the indicator at least three times to ensure a consistent sounding level has been reached.

    c. Measure and record depth (nearest 0.01 feet) to the water surface from the top of casing in field logbook.

    d. Lower the indicator to the well bottom and record the total depth.

    e. Retrieve and decontaminate water level indicator.

5. Calculate volume to remove for purging.

Lower decontaminated low-flow purging device into well within the screened area of the well producing the highest flow rate. Begin pumping and measure the groundwater elevation to ensure that the aquifer is not being stressed. If significant draw down occurs, reduce the pumping rate. Flow rates should be 100 ml/min or less.

Observe and record: odor, color, clarity, turbidity and general water condition in logbook. Also record changes in the physical condition of the monitoring wells that could affect the well integrity.

Temperature, pH, turbidity, and specific conductivity of the groundwater quality will be measured and recorded periodically during well purging. The sample may be collected after the water has cleared sufficiently, water quality indicators have stabilized after 3 successive measurements, and at least one well volume has been removed. Stabilization is defined as follows: temperature ± 1°C, turbidity ± 10%, pH ± 0.1 S.U., and conductivity ± 10 μmhos/cm^2. The goal for turbidity is 50 NTUs.

After the monitoring well is purged, do not turn off the pump or remove it from the well.

Groundwater sample collection using the low-flow method is as follows:

1. Purge the monitoring well as described previously.

2. Use the pumping device already in place to collect the samples where turbidity can influence the analytical results (such as metals). Flow rate will be 100 ml/minute or less. If field filtering is required, an in-line 45-micron filter will be inserted into the sample intake line.

3. If a peristaltic pump/ vacuum jug assembly or stainless steel and bladder pump were used for purging, continue to collect the remaining samples using these devices. Flow rate will be 100 ml/minute or less.

4. If neither of the devices listed above were used, carefully remove the pump from the well and use a bailer to collect the remaining groundwater samples.

5. After the sample bottle is filled, the cap will be placed on the bottle and the bottle will be packaged for shipment as specified in Section 5.0.

6. QA/QC samples will be collected as specified in Sampling Guideline 4.10.

7. Conductivity, pH, turbidity, and temperature will be measured after sample collection. The measurements will be recorded in the field logbook.

4.6.3 Records

Sample collection records will be kept in the field logbook. The information recorded is described in Record Keeping Guideline 4.9. In addition, the following records will also be reported:

- Observations of groundwater condition (see above).

- Field measurements.

4.7 RADIOLOGICAL SURVEY PROCEDURES

4.7.1 Scope and Purpose

This section provides the approved procedures for the collection of radiological surveys. The purpose of this guideline is to ensure that samples collected for radiological analysis are collected and handled properly.

4.7.2 Sampling Procedures

Soil, sediment, and groundwater samples will be collected as specified in the appropriate procedures (4.1, 4.3, and 4.6), but the following additional procedures will be applied when dealing with samples for radiological analysis:

1. Conduct an operational check of the Geiger Mueller survey meter pursuant to guideline presented as A.3.
2. Survey an area (1 meter x 1 meter) where no radiological materials were stored to establish the general site background. The meter shall be held approximately on half inch from the ground surface. Record the average value in counts per minute in the field log.
3. Survey the area around the intended sampling location before sampling. This will identify the presence of gross contamination by comparison to the background readings. The sample should be collected from the location where the highest readings (count per minute) are detected. Record the readings in the field log book. This step will allow a field assessment of whether the site is radioactively contaminated.
4. If radioactivity is detected above background, then the sample collection process will continue after the appropriate personal protective equipment is donned and Health and Safety precautions in place (tyvek coveralls and respirator).
5. As samples for radiological analysis are collected, the outside of the sample collection device will be scanned using the Geiger Mueller survey meter. In the case of groundwater, this survey will be conducted during the purging process.
6. Once the radiological samples have been collected in the appropriate sample containers, the outside of the containers will be scanned using the Geiger Mueller survey meter.
7. If radioactivity is detected above background, the outside of the container will be wiped with distilled/deionized water (wipe will be disposed of as radioactive waste for special on-site disposal as determined by depot personnel).
8. The outside of the container will once again be scanned for radioactivity.
9. Repeat steps 4 and 5 until background radioactivity readings are detected.
10. If radioactivity has been detected above background while scanning during the sample collection process, a record will be made in the field logbook (data recorded in counts per minute) and the laboratory performing the analysis will be notified via the chain of custody form.
11. Shipping containers carrying samples which contained radioactivity above background levels will be properly labeled and packaged. Prior to shipment of these packages, Federal Express Dangerous Goods Hot-Line will be consulted (800-463-3339 ext. 81) and Chem Tel's Environmental Services Division will be contacted (813-248-0573) to ensure that proper shipping protocol has been used. The UN number for the radiological samples collected will be UN2912.

12. Equipment which contained samples determined to be radioactive above background levels, will be scanned with the Geiger Mueller survey meter after being decontaminated (Guideline 4.8).
13. If the radioactivity is detected above background, the equipment will be decontaminated with a distilled/deionized wipe (wipe will be disposed of as radioactive waste for special on-site disposal as determined by depot personnel) prior to being re-surveyed.
14. Repeat step 13 until radioactivity is not detected above background levels on the equipment.

4.7.3 Records

Radiological survey records will be kept in the field logbook. The information recorded will include the general requirements presented in Record Keeping Guideline 4.9. The following records will also be included:

1. Description of radioactivity scans including: time, date, material scanned, instrument reading, person performing the scan.

2. Corrective action taken when radioactivity was detected above background levels.

4.8 DECONTAMINATION PROCEDURES

4.8.1 Scope and Purpose

This section provides the approved procedures for decontaminating sampling equipment prior to each use. The purpose of the guideline is to ensure the cleanliness of the sample collection equipment and to reduce the risk of cross contamination during sample collection.

4.8.2 Decontamination Process

4.8.2.1. Sample collection devices will be decontaminated prior to each use. All potentially hazardous rinse liquids and materials will be containerized and properly disposed, in accordance with the project-specific work plan, if necessary. Decontamination methods will be modified if necessary, based on the project-specific work plan. All decontamination procedures The decontamination methods to be used for sampling equipment are as follows:

4.8.2.2. Sample collection devices (bailers, stainless steel scoops/spoons, hand auger bucket) used to collect groundwater, surface soil, subsurface soils, surface water, or sediment samples:

1. Wash with tap/potable water and laboratory-grade detergent (Alconox or Liquinox). Use a scrub brush to remove dirt and surface film.
2. Rinse thoroughly with tap/potable water.
3. Rinse with deionized, organic-free, reagent grade water
4. Remove excess water.

5. Wrap in aluminum foil, shiny side out.
6. Radiological sample collection - scan sampling equipment with Geiger Mueller Meter for sampling equipment used to collect radiological samples only. If a positive reading occurs continue the deionized, organic-free, reagent grade water rinse until equipment is determined to be free of radioactive material.

4.8.2.3 Submersible Pump and Water Level Indicator:

1. Wash outside of pump/water level indicator and hoses/lines with Alconox and water.
2. Rinse outside of pump/water level indicator and hoses/lines with potable water.
3. Rinse outside of pump/water level indicator and hoses/lines with distilled water.
4. Remove excess water.
5. Wrap pump hose in plastic, pump in aluminum foil, and wrap water level indicator in plastic.

4.8.2.4 Drilling Rig:

1. Any portion of the drilling rig that will be over the borehole, including hollow stem augers, will be cleaned with pressurized hot water.
2. Downhole tools such as augers will be brushed cleaned using soap and tap water if pressure cleaning does not remove particulate matter.
3. Split spoons, used to collect soil samples, will be cleaned as described in 4.8.2.2.
4. Cleaned down hole equipment such as augers, will be placed on clean tarps, racks, or sawhorses to dry.
5. After drilling equipment has been allowed to dry, it will be covered with clean, unused plastic.

The equipment decontamination area should be a clean area free of fugitive dust and organic vapors if possible. The decontaminated equipment will be covered with aluminum foil or plastic following decontamination.

4.8.3 Records

Decontamination records will be kept in the field logbook. The information recorded will consist of, but not be limited to:

1. Date and time decontamination process performed.
2. Name of person(s) performing decontamination.
3. Equipment being decontaminated between locations.

4.9 RECORD KEEPING PROCEDURES

4.9.1 Scope and Purpose

This section provides the approved procedures for keeping records during field activities. The purpose of the guideline is to ensure that sufficient information is recorded to fully document field activities.

4.9.2 Record Keeping Process

4.9.2.1 Field Analytical Records

A logbook will be maintained during each sampling event. Its primary purpose is to provide documentation of activities that occurred in the field, including the conditions or activities that affected the fieldwork. Entries in the logbook will be signed and dated. Any corrections made in the logbook will be marked through with a single line and then dated and initialed. The following is a partial list of the types of information that may be recorded in the logbook:

- Name and title of author; date and time of entry; and physical/environmental (weather included) conditions during the daily field activities.
- Names of field personnel.
- Names and titles of all site visitors.
- Sampling activity purpose and plan.
- Type of sampled media (i.e., groundwater, surface water, sediment, surface soil, subsurface soil).
- Sample collection method.
- Number, type, and volume of samples taken.
- Description of sampling points (including location).
- Sample description.
- Analysis, number of containers, and preservation required.
- Client address.
- Date and time sample was collected.
- Laboratory shipping address.
- Instrument operational check records.
- Description of sample collection activities.
- Overnight shipper air bill number for each shipment.

4.9.2.2 Data Quality Control Reports

During the field investigation or remedial action activities, daily contractor quality control reports (QCRs) should be prepared daily, dated, signed by the project contractor quality control representative, and sent to USACE at a rate specified in the scope of work or specifications. With respect to geotechnical and chemical procedures, these reports should include weather information at the time of sampling, field instrument measurements, calibrations, identification of all field and control samples taken, departures from the approved SAP necessary, deviations from approved geotechnical procedures (such as well installation or drilling), any problems encountered, and instructions from Government personnel. Any deviations that may affect data quality objectives must be conveyed to U.S. Army Corps of Engineers (USACE) personnel (project manager, technical manager, project chemist) and the DNSC site POC immediately. The following should be attached to the daily contractor QCRs: quality assurance (QA) sample tables that match up primary, replicate (quality control (QC)/QA), and other field control samples (e.g., blanks), copies of chain-of-custody forms, field-generated analytical results, and any other project forms that are generated. An example form is provided in Appendix B.

4.9.2.3 Photographic Records

Photographs will be collected at all locations to document field activities. Typical photographs may include, but are not limited to, sample locations, field equipment, onsite structures, and various sample media (i.e. soil, sediment, groundwater, and surface water). Photographic logs will be kept in the field book and transferred to electronic files following the completion of fieldwork activities. All photologs will be included as an appendix to the investigation report at each site.

4.9.2.4 Data Management

All analytical and field data collected as part of any investigation will be stored in hard copy and electronic form at the Parsons office conducting the investigation. Microsoft Access, Excel, Word and PowerPoint will be utilized to store analytical data and generate documents. All data and information relating to each specific project will be kept on file at the respective Parsons office for 10 years following the completion of the project.

4.10 QA/QC SAMPLE COLLECTION PROCEDURES

4.10.1 Scope and Purpose

This section provides the approved procedures for collecting QA/QC samples. The purpose of the guideline is to ensure that the QA/QC samples are collected in accordance with the project quality assurance objectives.

4.10.2 QA/QC Process

In addition to the collection of environmental samples, five different types of QA/QC samples will be collected at each site. Section 3.0 describes the purpose for collecting each of these samples.

4.10.2.1 Trip Blank

Trip blank samples are used to evaluate potential volatile organic contamination related to sample bottle handling and sample transportation. Trip blanks are prepared by the laboratory, transported to the field, kept with the environmental samples throughout the sampling effort, and returned to the laboratory for analysis with the volatile organics environmental samples. One trip blank will be included in every cooler containing surface water and/or groundwater environmental samples for volatile organic compound analysis. Trip blanks will not be included in shipments that contain only soil or sediment samples for volatile organics analysis.

4.10.2.2 Coded Field Duplicate

A field duplicate sample is defined as a second or duplicate sample collected from the same location of the field sample under identical conditions. Duplicate samples will be labeled so that the laboratory personnel performing the analyses cannot distinguish the duplicate sample from the field samples. The duplicate samples provide a measure of the representativeness of the sampling procedure. The coded field duplicate sample for volatile organic analysis will be collected immediately following the collection of the field sample for volatile organics analysis. The remaining bottles will then be filled, with the field sample being collected first and the coded field duplicate sample being collected last. One coded field duplicate sample may be collected for every ten field samples collected per matrix (10%). The coded field duplicate will be analyzed for the same parameters as the field sample.

4.10.2.3 Equipment Blank

Equipment blank samples are samples of clean analyte-free water passed through and over the sampling equipment. These blanks permit evaluation of equipment decontamination procedures and potential cross-contamination of environmental samples between sampling locations. The number of equipment blanks for each project will vary from site to site and be dictated by state regulations. However, at a minimum, one equipment blank will be obtained from each type of sampling tool used to collect environmental samples per site.

4.10.2.4 Matrix Spike/Matrix Spike Duplicate (MS/MSD)

MS/MSD samples are collected to determine if matrix interferences exist during analysis of the field samples. MS/MSD samples will be collected at a frequency of one pair for every twenty-field samples collected at each depot per matrix. The MS/MSD samples will be identified in the work plan, but may be changed in the field if necessary. The selected sample locations will require the collection of two additional sets of samples in addition to the field sample. The location(s) selected for collection of the MS/MSD samples will be all-inclusive of the analyses to be performed for that matrix at that depot. These samples are packaged and shipped with the field samples via overnight express to the laboratory.

The following procedures will be followed for the collection of the QA/QC samples:

1. Carefully fill pre-cleaned, pre-preserved, pre-labeled sample bottles, starting with volatile organic samples.

2. Make sure there are no bubbles in the volatile organic water samples.
3. Continue to fill remaining bottles.
4. After the sample bottle is filled, the cap will be placed on the bottle and the bottle will be packaged for shipment as specified in Section 5.0.

4.10.2.5 QA Splits

The QA split is defined as a field duplicate/triplicate that is collected from the same location as the parent sample under identical conditions. The sample is sent to a USACE-designated laboratory for independent analysis. The QA split sample will provide a measure of the representativeness of the sampling procedure. The QA split sample containers will be filled immediately after the field duplicate samples. The required frequency will be ten percent of all samples collected per site per matrix. Waste characterization samples will not be collected as QA split samples. The sample ID will be identical to the parent sample with the addition of "QA" to the name.

4.10.2.6 Records

Sample collection records will be kept in the field logbook. The information recorded is described in Record Keeping Guideline 4.9 and, the following will also be included:

1. Type of QA/QC sample collected, required analyses, and the associated environmental samples.
2. Equipment used for rinsate sample; type and quantity.
3. Coded field duplicate sample ID will be recorded next to environmental sample ID and will be labeled as a coded field duplicate. Also, all QA Splits will be identified in the logbook, as well as, the laboratory to which the sample was sent.

4.11 INVESTIGATION DERIVED WASTE

4.11.1 Scope and Purpose

This section provides the approved procedures for containing, sampling and disposing of investigation derived waste (IDW). The purpose of the guideline is to ensure that any waste generated as a result of field activities is disposed of in accordance with the project quality assurance objectives.

4.11.2 Containerization

All IDW generated during fieldwork activities will be segregated by type and location (if warranted) and placed in sealed 55-gallon drums. IDW may include, but is not limited to, soil, sediment, purge water, drilling water, decontamination water, sampling and decontamination equipment, and personal protective equipment (PPE). At the completion of all fieldwork activities, each drum of IDW will be relocated to a central location specified by the DNSC manager for that facility.

4.11.3 Sampling

Each type of IDW will be sampled (if necessary) by Parsons in accordance with the site-specific Work Plan. Analytical results will be used to determine the final disposition of the waste.

4.11.4 Disposal

Unless otherwise specified, all IDW will be disposed at an appropriate disposal facility. Waste disposal companies and disposal facilities will be identified in the waste disposal contractor's subcontract, and in the project-specific Work Plan. Following receipt of analytical results from the waste disposal contractor, the material will be disposed at an appropriate disposal facility. All waste manifests will be reviewed by USAESCH and then signed by the DNSC site manager as documentation of the disposal activities.

SECTION 5

SAMPLE HANDLING

This section describes the manner in which all samples will be handled including sample custody, designation of sample location, bottle labeling, container and preservation requirements, and bottle packaging.

5.1 SAMPLE CUSTODY

Samples shipped to the laboratory for analysis will be accompanied by a chain of custody form (the specific form will typically be provided by the laboratory). These forms track the custody of the samples after they have been collected and verify the information on the bottle labels. Every sample bottle shipped to the laboratory for analysis will be listed on the chain of custody form. Other information on the form include:

- Job number
- Project name and location
- Samplers names
- Date and time of sample collection
- Sample location identification
- Number of containers
- Analysis and preservation required
- Sample type and matrix
- Laboratory address
- Remarks
- Airbill number
- Relinquishing signatures, dates and times

5.2 SAMPLE DESIGNATION

A sample numbering system will be used to identify each sample collected during the field investigation and for all QA/QC samples. The numbering system will provide a tracking procedure to allow retrieval of information about a particular location and to monitor that each sample is uniquely numbered. The samples will be identified by the following sample designation scheme, or a similar scheme as described in the project-specific work plan. Each sample taken at a specific depot will be preceded by an abbreviation (identified in the site-specific sampling plan) to identify the sample location. Field duplicate and/or split samples will be designated by adding 100 or 200 (depending on number of samples) to the sample number to

distinguish between the investigation sample and the QA sample. The sample designation will include the following:

Sampling Location Sample Type Sample Number Sample Depth

Sample Type Abbreviations which may be used include:

SS	Soil Sample
SW	Surface Water Sample
SD	Sediment Sample
GW	Ground Water Sample
AR	Air Sample
RD	Radiological Survey
TB	Trip Blank
EB	Equipment Blank
RB	Rinsate Blank

Example sample number: **PP-SS-01-2'**
Explanation: Point Pleasant depot, surface soil sample, location 1, at a depth of 2 feet. For samples with a depth range, the identification will specify the range accordingly (i.e., PP-SS-01-0'-2' for a 0 to 2 foot sample depth range).

5.3 SAMPLE BOTTLE LABELS

Each bottle shipped to the laboratory for analysis will have a sample label containing the following information:

- Project name
- Depot name
- Job number
- Sample number designation
- Date and time of sample collection
- Analysis required
- Preservation
- Sampler

Prior to sample collection, the sample label information will be completed, the label will be placed on the appropriate bottle, and covered with clear tape to protect the sample label.

5.4 SAMPLE BOTTLE AND PRESERVATION REQUIREMENTS

Precleaned, and preserved sample bottles will be provided by the laboratory for use in collecting samples. Tables 3.3 and 3.4 contain the preservation and bottles which will be used for various analyses.

5.5 SAMPLE HANDLING

Upon collection, all samples will be placed immediately on ice and will be kept cool (4 ± 2°C) until packaged to ship to a laboratory facility:

1. Seal the container by wrapping tape around the lid of the container. Use Teflon® tape on bottles containing samples for organic constituent analysis. Use PVC tape on bottles containing samples for inorganic constituent analysis.
2. Place containers in bubble pack.
3. Place all glass containers in ziplock-type bag and seal.
4. Line insulated shipping cooler with a large trash bag and place samples into the lined, insulated cooler then cool (to 4° C) using wet ice, immediately after sample collection.
5. Seal completed chain-of-custody form in a ziplock-type plastic bag and tape to the inside of the cooler lid.
6. Close trash bag and seal with tape.
7. Securely seal shipping container/cooler with packing tape and custody seals (provided by laboratory).
8. Ship container/ cooler to the appropriate laboratory via overnight express.
9. Unless specified differently in project-specific addendum, all project samples will be shipped to:

   General Engineering Laboratories, Inc
   2040 Savage Road
   Charleston, SC 29407

   POC: Valerie Davis
   Phone (843) 556-8171

   Unless specified differently in project-specific addendum, all QA Split samples will be shipped to:

   Sample Custodian
   ECB Laboratory
   420 S. 18th Street
   Omaha, NE 68102

   POC: Laura Percifield
   (402) 444-4313